ESONET: TOWARD AND EUROPEAN NETWORK OF SEA OBSERVATORIES

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1 - Introduction

ESONET is an European Network of Excellence (NoE) associating 50 partners (research centres, universities, industrials and SMEs) from 14 countries: France, Germany, Italy, UK, Spain, Portugal, Greece, Belgium, Ireland, the Netherlands, Norway, Sweden, Bulgaria and Turkey. More than 300 scientists and engineers are participating to its activities.

The goal of the ESONET NOE is the lasting integration of European research on deep sea multidisciplinary observatories. Over the initial 4 years, the approach will be to merge the programmes of members Organisations through research activities addressing the scientific objectives and networking activities specially designed for integration and spreading Excellence.

2 – Results and discussion

ESONET NoE is creating an organisation capable of implementing, operating and maintaining a network of multidisciplinary ocean observatories in deep waters around Europe from the Arctic Ocean to the Black Sea.

Only long-term observatories allow continuous observation of large numbers of parameters. This capability is crucial for observing natural processes that are either very episodic or statistically require long time series to detect because they are hidden by noise of higher frequency. The ESONET predecessors have identified such processes in all fields of marine sciences. The most important ones are: (1) the episodic release of methane from the seabed affecting climate change, (2) the relationship between earthquakes, tsunami generation and submarine slope failures, and (3) the short term biogeochemical processes affecting the marine ecosystem. These processes are of fundamental importance for European society, because we need to devise sensible climate change policies, protect our coastal population and infrastructure, and manage our marine resources. The establishment of long-term marine observatories can be justified because they are the only means of acquiring continuously large amounts of different data, and be able to respond to them through interpretation task forces. The ESONET project has identified several of crucial scientific objectives. Until funding for installing the observatories becomes available it is tantamount to continuously update these objectives as new scientific results become available, to sharpen the objectives, and to adapt the technological requirements to the refined scientific objectives.

The ESONET observatories will provide information on global change, warnings of natural hazards and a basis for sustainable management of the European Seas. They will be a sub-sea segment of the GMES and GEOSS initiatives and linked to the EU INSPIRE initiative.

A network of observatories around Europe will lead to unprecedented scientific advances in knowledge of submarine geology, the ecosystem of the seas and the environment around Europe. Very rapid advances in technical knowledge are anticipated. Our efforts are part of a system extending around the world in co-operation with Japan [1], USA [2] and Canada [3].

The NoE [4] is working towards establishing sea floor and water column infrastructure which will provide power for instruments and real-time two-way data communications. Key areas around Europe have been identified from which specific targets are selected for relevant science programmes of potential hazards, geo hot spots and ecosystem processes. Sea floor infrastructure will provide platforms for instrumentation deployed throughout the water column and the geosphere below.

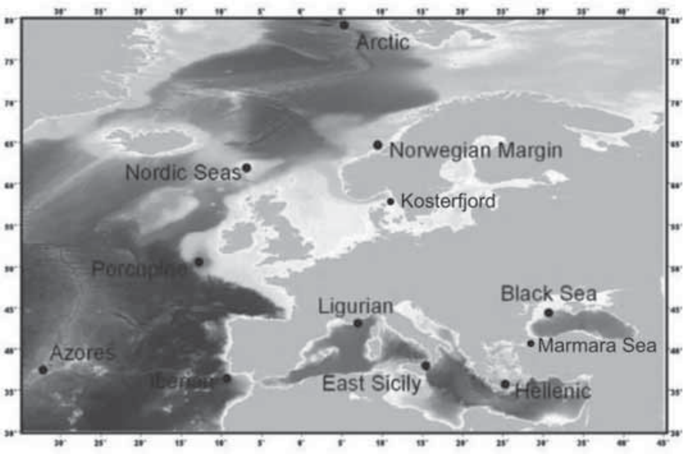

Fig.1: The sites proposed by ESONET

These ambitions are to be realized with new, advanced organisational structures linking scientific institutes, industries, governments and agencies throughout Europe and by initiating integration processes. The NoE is constructing that framework.

The integration process of ESONET NoE, a permanent effort during the project, is based on :

.building up active groups sharing their knowledge, methods and resources.

.acting as one body towards funding institutions (including EC), stakeholders, potential users and similar international projects,

.jointly acting for a strong cooperation with other networking efforts in ocean sciences, ocean technology, ocean data management (GEOSS, MERSEA, GMES, HERMES, EUR-OCEANS), and infrastructure (SEADATANET).

.Establishing functional relationships with the above (knowledge or data provider, cooperation, complementary scientific goals, complementary sea or subsea intervention means,…),

.Advancing the infrastructure policy of subsea observatories in Europe.

.On line monitoring to make the investment safer including quality control.

.Combinating oceanographic, geological, and biological themes at one station to enhance cost effectiveness compared to short term deployments

From the beginning of the project, lasting integration is in perspective through the construction of a permanent structure able to provide a set of ESONET CORE SERVICES, related to ESONET REGIONAL LEGAL ENTITIES. All of them will be linked for their implementation scheme as well as for a scientific and technical improvement process.

The RLE (Regional Legal Entity) might be a research institute, a government agency, a company or a partnership or private organization depending of the size and circumstances of the project. The ESONET RLE would be responsible for providing the utility services to the observatories in the ocean and will report to the stakeholders and financing bodies. The ESONET RLE would be responsible for receipt of funds from international, national or regional sources and paying for installation and operation of the regional observatory.

3 – Conclusions

The kick-off meeting of the project was held in Brest on March 21st – 23rd, 2007 in Brest. It was decided to organize in Barcelona September 5th-7th, 2007 a "All regions" workshop where the ESONET RLE were constituted. In parallel a call was published to co-fund demonstration missions showing to scientists and to public the interests of sea observatories

4 – References

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OPTIMIZATION OF DATA ACQUISITION SYSTEM FOR MARINE SEISMIC EXPERIMENTS

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1. Introduction

The progress in marine instrumentation during the last decades has allowed improving the quality of the data acquired, as well as adding more features to the equipment. In marine seismic experiments, the active source is placed many kilometers away from the sensor, bringing up the need for a high resolution acquisition system where parameters as Signal-to-Noise Ratio (SNR) and Effective Number of Bits (ENOB) have to be optimized.

This paper presents a high resolution acquisition system designed and built for our new Ocean Bottom Seismometer (OBS) constructed. This version of the equipment is the result of a series of optimization tasks carried out on a previous one. The results of these optimization tasks have been evaluated in the lab by the direct comparison of the characterization test results of both versions. The performance of the optimized version of the system has been tested in real enviromental conditions during the CALIBRA 2006 active seismic survey.

OBSs are instruments used to collect underwater seismic data. They are widely used in active seismic experiments where a compressed air gun acts as the active source [1]. In such experiments, a series of OBSs are deployed on the sea-bed at a depth of up to 6000m. The instrument is equiped with 2 sensors: a tri-axial geophone that is coupled to the sea-bed to collect the refracted data, and a hydrophone that registers the reflected signal. An oceanographic vessel is used to drag the compressed airgun and shoot every certain time (90-120 s). The acoustic signal generated by the air gun travels to the bottom of the sea, where it is reflected and refracted by different ocean sublayers. The refracted signal can travel tens of Km before it is detected by the geophone, so having a small amplitude. The equipment is recovered by sending an acoustic signal with a certain code from a telecommand unit on-board. When this signal is received by an acoustic transducer, the anchor weight is unattached by a motor driven unit [2]. Figure 1 shows a picture of the OBS constructed:

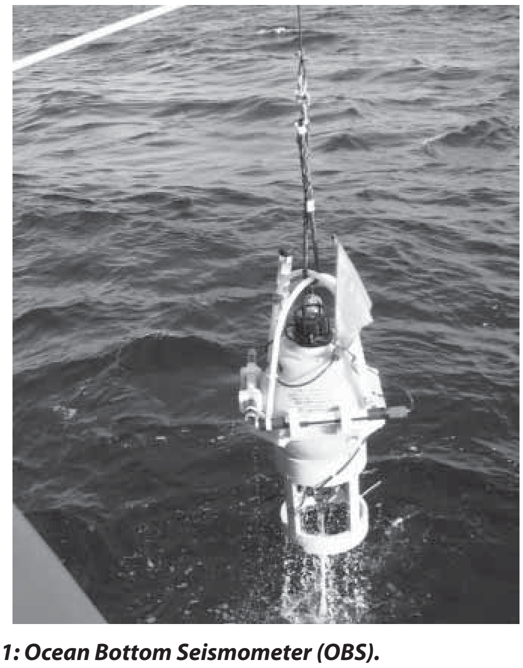

Figure 1: Ocean Bottom Seismometer (OBS).